4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

The surface estate of the WMA is almost entirely privately owned. Coteau holds coal leases for the non-Federal coal and is expected to recover all non-Federal coal reserves. Adding Federal reserves to the WMA mix would not constitute a substantial alteration to the overall mine plan because unleased Federal coal accounts for a modest fraction of total reserves.

4.2 ANALYSIS ASSUMPTIONS

The surface mining operation would be a major undertaking with activity occurring far and wide. Equipment used would include a dragline, overburden trucks and shovels, bulldozers and bottom-dump coal haulers, front-end coal loaders and a variety of trucks (water, dump, supply, fuel, welding, field maintenance). One might expect to see coal drills, cable movers, sheepsfoot compactors, road graders, mobile cranes, portable air compressors, water pumps, and scrapers on the mine site at any given time.

Coteau employs some 400 persons working two ten-hour shifts for 5-to-7 days per week, depending on conditions and the season of year. It is estimated that as much as a quarter section (160 acres) of coal lands could be disturbed by direct impacts (overburden removal and coal extraction) during an average year in the WMA. Because reclamation is concurrent with mining, an additional 200 acres would be unavailable for crops or grazing at any given time.

4.3 AIR QUALITY

Coal mining and processing at the Freedom Mine are a source of particulate and gaseous air pollutants. Fugitive dust is generated by mining, hauling, processing, and storing coal and is mitigated by dust suppression practices. Gaseous pollutant emissions are generated by engine exhaust from mining equipment and by blasting.

Regulation of industrial air quality falls under the auspices of the North Dakota Department of Health, Environmental Health Section. Compliance with the terms and conditions of an air quality permit ensures fulfillment of applicable State and National Ambient Air Quality Standards (NAAQS).

Alternative A (Proposed Action)

Coteau operates the Freedom Mine under authority granted by North Dakota Air Pollution Control Minor Source Permit to Operate # 085004. The WMA was included in the original permit application and is covered by Coteau's existing permit.

Through the air-quality permit, North Dakota Department of Health set standards that ensure the project meets requirements of State and Federal air-quality regulations. Under Alternative A, development of the WMA would maintain coal production as allowed under Coteau's air quality permit. Maximum annual coal production is limited to 15–16 million tons per year.

Alternative B (No Action)

Impacts to air resources would be similar to those describe above. Freedom mine would be expanded to include State and Private Coal; Federal reserves would be by-passed during mining. A maximum of 15–16 million tons of coal would be processed at the mine each year.

Alternative C (Preferred)

Impacts under this alternative would be identical to Alternative A. Federal, State, and private coal reserves would be mined and processed. Control of particulate emissions, as required by Coteau's air-quality permit, represents standard industry practice for minimizing particulate emissions.

In summary, mining operations would comply with State ambient air-quality and Class II annual standards under any of the alternatives. No residual or cumulative impacts to air quality or climate (from particulate or gaseous emissions) would occur from a continuation of the present level of operations at the Freedom Mine.

Sulfur Dioxide Exceedences

The U.S. Environmental Protection Agency (EPA) submitted comments on sulfur dioxide emissions from coal-fired power plants using lignite coal from the Freedom Mine as follows:

> [S] ulfur dioxide air emissions in the area of this mine have exceeded the level of significant deterioration (PSD increment) in several areas valued for high-quality, clean air such as National Parks. * * * For this project * * * areas affected by sulfur dioxide emissions include the Theodore Roosevelt National Park (3 units), the Lostwood Wilderness Area, the Medicine Lakes Wilderness Area in Montana and the Fort Peck Indian Reservation.

Sulfur dioxide results from burning coal, an activity indirectly associated with leasing and mining of Federal coal. The BLM does not permit nor monitor burning of coal for purposes of generating electricity. Freedom Mine's end use facilities are all operational and licensed by the proper authority.

The North Dakota Department of Health, which is charged with responsibility for air-quality monitoring in North Dakota, is negotiating with the EPA concerning sulfur dioxide exceedences in areas of unspoiled air quality. Resolving differences in the measurement and enforcement of air quality standards between State and Federal regulators is beyond the scope of this EIS.

4.4 WATER RESOURCES

Groundwater

Surface coal mining impacts groundwater quantity in two ways: (1) aquifers are removed and replaced with unconsolidated backfill and (2) groundwater levels in aquifers adjacent to the mines are lowered as a result of seepage and dewatering into the open pit. If Federal tracts are leased, the area of coal removal and reclamation at Freedom Mine would increase slightly and impacts to groundwater would increase. The area subject to lower water levels would grow roughly in proportion to the area being mined.

Mining of each Federal tract would replace shallow aquifers with backfill composed of an unlayered mixture of the clay, silt, and sand that makes up the Sentinel Butte Formation. Impacts to the local groundwater system would include dewatering the coal and overburden within the area of coal removal and enlarging the area of drawdown caused by coal and overburden removal. The extent that a drawdown propagates away from a mine pit is a function of the water-bearing properties of the aquifer. Low permeability of lignite aquifers suggests that measurable declines in groundwater levels would not extend more than one to two miles from an active mine site (Crawley and Emerson 1981).

Disturbances from mining may result in altered chemical quality of shallow groundwater aquifers. Increases in sodium, sulfates, and total dissolved solid concentrations have been reported by Groenwald (1980) and Groenwald and Rehm (1979) at other mines in North Dakota with similar overburden. Degradation of water quality at the mine site is likely. Water quality in replaced overburden would be similarly degraded.

Surface mining would not adversely impact water levels and water quality in deep aquifers. Replacement water from deeper aquifers would be available if shallow wells were adversely affected.

Up to one dozen private water wells could be impacted (either directly by removal of the well or indirectly by water-level drawdown) by mining operations occurring within the WMA. In compliance with state law, mine operators are required to provide the owner of a water right (one whose water source is interrupted, discontinued or diminished by mining) with water of equivalent quantity and quality; this mitigation measure would be included under any mining approval. The most probable source of replacement water would be from an aquifer beneath the Beulah-Zap coal seam. Subcoal aquifers are not removed or disturbed by coal mining and so are not impacted by surface mining activity.

Surface Water

Alteration of existing drainage patterns would occur during mining and reclamation. Because of erosion and sediment control measures (including sediment-control ponds) used during and after reclamation, increase in sediment load to Spring Creek, Antelope Creek, and Lake Sakakawea are expected to be minimal. Erosion could occur during periods of measurable rainfall and snowmelt runoff. Once vegetation growth and density on reclaimed areas becomes sufficiently reestablished, many of the erosion and sediment controls would no longer be necessary. Sediment control is subject to limitations of a National Pollution Discharge Elimination System Permit.

Alternative A (Proposed Action)

Direct and indirect impacts to water resources would occur as a result of coal mining and related activities. Excavation of an open pit would temporarily disrupt local surface water drainage systems. Impacts to ground water would also occur because mining would remove portions of several sedimentary layers in the WMA.

Alternative B (No Action)

Because mining of non-Federal coal would disturb much of the WMA, the impacts under this alternative are similar to those of Alternative A.

Alternative C (Preferred)

Impacts to water resources under Alternative C would be as described for the Alternative A.

The postmining backfill may take in excess of 100 years to reach equilibrium water levels and water quality. Less time would be required near the mining boundaries. Water level and water quality in the backfill would possibly be suitable to provide water to wells for livestock use, but would be different from premining conditions.

Replaced wetlands may not duplicate the exact function and landscape features of all premining wetlands. However, all wetland replacement plans would require approval by the PSC.

4.5 SOILS

Alternative A (Proposed Action)

A short-term loss of soil productivity would occur during mining; productivity would be restored with proper reclamation and management. Topsoil and subsoil removed during early stages of mining would provide an adequate layer of productive material to be replaced and averaged on reshaped overburden during reclamation. PSC's "Rules Governing Reclamation of Surface-Mined Land" requires all soils within mine permit areas to be intensively surveyed, with depths of topsoil and subsoil layers to be saved, identified and marked prior to lifting. Soil material would either be stockpiled for later redistribution or direct hauled to reshaped overburden that is ready for soil replacement.

Soil instability and erosional problems associated with reclamation would be kept to a minimum with proper handling techniques and adherence to regulatory guidelines as promulgated in Rules Governing Reclamation of Surface-Mined Land (Public Service Commission, 2001). All runoff from disturbed areas would be required to pass through sedimentation ponds on the mine permit areas, thus trapping water eroded soil materials before they move offsite. Vegetative cover would be restored on re-spread soils as quickly as possible to stabilize sites and reduce erosion. Reclaimed lands would remain under bond with the PSC until such time that successful reclamation is demonstrated under their standards.

Disturbance of any identified prime farmland would require operations in accordance with performance standards stipulated in Rules Governing Reclamation of Surface-Mined Land.

Alternative B (No Action)

Impacts to soils would be the same as those described for Alternative A, but the 5,571 acres of Federal coal would not be leased under this alternative. Even though the Federal coal would not be leased, much of the private surface above it could be disturbed by pit-wall layback, haul roads, soil stockpiles, sedimentation ponds and the like. About 5,000 of the 5,571 acres over Federal coal could potentially receive surface disturbing activities under this alternative.

Alternative C (Preferred)

Impacts to soils would be as described under Alternative A. The soils as they once existed would disappear with removal prior to mining. The new soil returned during reclamation would be a mixture of the soil originally removed and would develop its own characteristics. Productivity of this new soil would return with good management during reclamation

4.6 LAND USE/VEGETATION

Alternative A (Proposed Action)

Mining would modify topography of the area. Changes in the surface configuration are expected after reclamation as the landscape is restored to its approximate original contour. Steeper slopes may be reclaimed at lower gradients to improve water infiltration and lessen the impacts of erosion.

More land may eventually be converted to cropland after reclamation depending upon surface-owner preferences. Vegetation would be removed in areas being mined, but would be reestablished during reclamation. Some invasive, non-native noxious weeds would be expected to take root during reclamation. The lessee would be required to control such weeds as part of a reclamation program, which would be overseen by the PSC.

Alternative B (No Action)

Impacts would be the same as under the proposed action except slightly less surface land and vegetation would be disturbed (see discussion for Alternative B under Part 4.5 Soils).

Alternative C (Preferred)

Impacts would be the same as under the alternative A. Residual impacts to land use are expected to be minimal because crop, rangelands, wetlands and other wildlife habitats would be replaced. Reclaimed prairie communities may never completely match the surrounding native plant community.

Wetlands, including fen-like wetlands, would be removed during mining. Appropriate water permits (i.e., Corps of Engineers Water Permit) would be required as part of the mine permit process. All wetland replacement plans submitted by the mining company would require approval by the PSC.

4.7 WILDLIFE

Alternative A (Proposed Action)

Wildlife habitat in the WMA has already been greatly reduced by modification of the land from native prairie to

agricultural uses. Remaining areas of native prairie have been converted to grazing lands for livestock or are harvested for hay. These habitats would be disturbed incrementally as mining progresses across the landscape. Wildlife, including migratory birds, would be disturbed or displaced where active mining would be occurring, but in turn would find new habitat in reclaimed lands or adjacent/nearby undisturbed areas. Restrictions to wildlife movement created by fences, spoil piles, and pits would also occur. Some wildlife mortality would be expected due to mining. Rodents, skunks, snakes and frogs would be most vulnerable to injury or death by surface operations.

Wetland, native prairie, wood/shrub habitat would be removed by mining. These habitats would be replaced as part of the reclamation process.

Alternative B (No Action)

Impacts to wildlife would be very much the same as under Alternative A. Federal coal would not be mined under this alternative, but the recovery of state and private coal and disturbances to private surface over Federal coal would result in similar impacts to wildlife.

Alternative C (Preferred)

Impacts to wildlife under this alternative would as described under alternative A. Residual impacts to wildlife would be minimal. Habitat restored as part of a well-developed reclamation plan could be as good as what existed prior to mining because of the alternations to the landscape that occurred due to farming and ranching over the past century.

No residual impacts to T&E or candidate plant or animal species are expected. BLM's North Dakota Field Office consulted with the FWS regarding T&E species. FWS responded by memo, dated 3/29/2002, that they were not aware of any T&E species listed for Mercer County frequenting the WMA. They concluded that FWS does not object to leasing the Federal coal tracts, consistent with BLM's 1988 Resource Management Plan. On 7/30/03 the BLM requesting an update from FWS on T&E consultation, as over a year has passed since the initial correspondence. The BLM North Dakota Field Office received a reply from FWS on 8/22/2003 confirming their earlier conclusion. There were no FWS candidate (Dakota skipper butterfly) or sensitive (western burrowing owl, Baird's sparrow) species observed during wildlife surveys conducted within the past three and one-half years in the WMA.

4.8 CULTURAL RESOURCES

To members of Indian communities with historical ties to the project area, stones and stone features are often as important today as they were in the past. As these stone features are destroyed and remaining features isolated it becomes more difficult for Indian people to gain access to stone-feature sites for traditional purposes. Traditional cultural uses include conducting cultural ceremonies and the collection of culturally important plants located adjacent to the sites. Some of these plants are important as food items and symbols of tribal identity; others may have ceremonial and medicinal uses.

While there may be a tendency to suggest that large and small rings should be considered "more important" because their functions may have been other than tipi rings (see Stone Rings in Archeological Features, Appendix D), consulted American Indians have not rated various stone features differently. Therefore, in this analysis, all stone features are ascribed an equal value. The numbers that are adversely affected, avoided, or preserved, and the acres of cultural landscape surrounding them are enumerated (Table 4.1). Access to preserved sites is also addressed.

A programmatic agreement and management plan for the cultural resources was developed for Alternative C (Preferred), in compliance with the NHPA and North Dakota Century Code, in concert with the requirements of SMCRA as set forth in the North Dakota coal program. The management plan, Coteau: A Cultural Resource Management Plan for the West Mine Area, Mercer County, North Dakota was used for analysis of the alternatives.

For Alternative A (Proposed), Historic Properties would be avoided or mitigated by archeological investigation; there would be no active preservation of the sites. Under Alternative B, BLM would withdraw from further cultural resource regulation. Historic Properties, however, would be avoided or mitigated by archeological investigations as in the Proposed Action under the North Dakota Century Code in concert with the requirements of SMCRA. Under Alternative B there would be no active preservation of the sites

A distinction between avoidance and preservation is critical to this analysis. Under a programmatic agreement and approved management plan, designated lands within and adjacent to the WMA would be donated to the North Dakota Indian Cultural Education Trust and preserved for future generations.

The Indian Cultural Education Trust was conceived by Coteau and enacted by the North Dakota Legislature in 2003. The purpose of the Trust, managed by the North Dakota State Land Department, would be to hold lands containing cultural resource sites for protection and preservation and to generate income through grazing leases for educational activities of American Indians. The lands would be conveyed into the Trust under the terms and conditions of donor agreements amongst Tribes. Donor agreements make provisions for specific site protection measures to be implemented by

the tribes and required by the State Historical Society. Any restrictions on public access or land-use activities (e.g. the manner in which net income from the Trust would be disbursed to the tribes, which tribal representatives are to be contacted with regard to Trust matters, along with any other provisions deemed necessary by the parties to the donor agreement or the State Land Department) are contained in the agreement.

Long-term site protection would be afforded for specific sites through the lessee's acquisition of lands and donation to the trust for perpetual preservation. Funds accumulated in the Indian Cultural Education Trust would allow American Indians to carry on an understanding of traditional cultures to their own people—knowledge that might otherwise be lost across the generations. In this way the future would serve as a link to the past. American Indian access would be provided to preserved sites, allowing them visitation rights to conduct ceremonies and other activities as they see fit, further maintaining and enhancing their connection to the land. Through coordination with tribal representatives, a seed mixture containing traditional plant life would be sown on disturbed lands placed in the Trust. Such would be available for plant collecting and ceremonial use by American Indians, thereby enhancing the traditional connection to life on the Plains.

Under the Proposed Action (A) and the No Action (B) alternatives, sites that are avoided would remain in private ownership. It would be at the landowner's discretion whether sites would be preserved and the lands remain in native pasture. Under Alternative C (Preferred) these sites, along with additional sites, would be placed in a Trust for the protection of cultural resources and the landscape.

Alternative A (Proposed Action)

The proposed action is to lease 5,571 acres of Federal coal beneath private surface. Leasing presupposes that the coal would be mined, resulting in direct effects to cultural resources. Under this action, physical disturbance of the only recorded unmarked burial would be stipulated for "No Surface Disturbance." To meet obligations under the NHPA, 14 Historic Properties located over Federal coal would be avoided or mitigated for their potential to yield scientific contributions to prehistory through planned archeological investigations in conjunction with 26 other prehistoric Historic Properties located over non-Federal coal within the WMA (Table 4.1). In addition, the only historical period Historical Property, 32ME189 would be mitigated through HABS/HAER documentation.

Approximately 5,323 acres and nine Historic Properties overlying Federal coal would be directly impacted (Table 4.1). Seven hundred eighty acres in the northwest corner of the WMA would be avoided. The 240 acres above Federal coal in this area would be stipulated "No Surface Disturbance." Within this area, 12 Historic Properties and 17 other sites would be avoided. Elsewhere in the WMA, 170 other prehistoric sites and 52 historical period sites would be destroyed. Seven hundred eighty acres within the WMA that would be avoided by mining activities and those small areas not necessary for the mine operation would remain undisturbed during the life of the mine. After mining has been completed, land ownership would revert to private (non-corporate) ownership and access would be by landowner permission. None of the sites would be actively protected from adverse effects.

Alternative B (No Action)

Under Alternative B, the application to lease Federal coal would be rejected and Federal coal reserves bypassed. Private surface over Federal coal would still be affected as non-Federal coal is mined. Historic Properties located on private and State coal leases would be mitigated under North Dakota Century Code in concert with the requirements of SMCRA as set forth in North Dakota's coal program. Coteau and the State of North Dakota would determine the management of cultural sites and landscape, Traditional Cultural Properties, and the only recorded unmarked burial. BLM would not be involved. For analysis purposes it is assumed that Historic Properties would be avoided or mitigated by archeological investigations as under Alternative A.

Direct and indirect impacts within the highwall buffer zone could destroy 102 stone rings, 85 cairns, one stone alignment, and two rock depressions. Historic Properties over Federal coal that could be affected or destroyed are 32ME108, 32ME156, 32ME206, 32ME209, 32ME1554, and 32ME1577. This amounts to some 43 percent (6 of 14) of the Historic Properties located above Federal coal. Current plans for the initial mining phase show important effects to the cultural landscape and similar impacts to cultural features. The effects are difficult to estimate, but it is known that proposed haul roads could impact two additional Historic Properties, 32ME238 and 32ME1513.

Coteau's current operation plans indicate that some 57 percent (8 of 14) of the Historic Properties located above Federal coal are likely to be destroyed under the No Action Alternative. For all cultural resources within the WMA, 46 percent of the stone rings (204 of 444), 59 percent of the stone cairns (98 of 167), 15 percent of the stone alignments (1 of 13), and 100 percent of the stone lined depressions (2 of 2) located above Federal coal could be destroyed by mining activities, even if no Federal coal is leased.

For this analysis it is assumed that the PSC would require avoidance of the same 780 acres within the WMA as under alternatives A and C. Within this area, 12 Historic Proper-

Table 4.1
Historic Properties Within the WMA
CMS is a cultural material scatter

NR Archaeo Site	Minerals	Avoid/ Preserve or Mitigate	Stone Rings	Stone Cairns	Stone Alignments	Stone Lined Depressions	Cultural Material Scatter/ Other
32ME108	FEDERAL	M	5				
32ME1474	PVT	M					CMS
32ME1475	PVT	M	1	1			
32ME1476	PVT	M	15	7			
32ME1478	PVT	M	4	3			
32ME1482	PVT	M	1				
32ME1483	PVT	M	7				
32ME1488	PVT	M	6				
32ME1491	PVT	M	22	7			
32ME1493	PVT	M	54	3			
32ME1513	FEDERAL	M	100	12	1		
32ME153	FEDERAL	M	83	7			
32ME1539	FEDERAL	A/P	1	2			
32ME1554	FEDERAL	M	27	1	1		
32ME156	PVT/FEDERAL	M	36	2			
32ME1562	PVT	A/P	27	4			
32ME1571	PVT	M	7	3			
32ME1577	PVT/FEDERAL	A/P	28	2			
32ME1578	PVT	A/P	1	1			
32ME1579	PVT	A/P	2	1			
32ME1580	PVT	A/P	1				
32ME1589	FEDERAL	M	1	9	6		
32ME167	PVT	M	11	1			
32ME169	PVT	M	16	1			
32ME171	PVT	M	3	1			
32ME182	FEDERAL	A/P	14	1			
32ME184	FEDERAL	A/P	8	2			
32ME185	PVT	A/P					CMS
32ME186	PVT	A/P	4				
32ME187	PVT	M		1			
32ME188	PVT	A/P					CMS
32ME206	FEDERAL	M	19	10	1	1	
32ME209	PVT/FEDERAL	M	24	1	1		
32ME232	PVT/STATE	M	27	23			
32ME233	STATE	M	13	6			
32ME238	FEDERAL	M	2	1			
32ME754	PVT	M	37	3			
32ME755	PVT	M	27	2			
32ME757	PVT	M	18	1			
32ME1486	FEDERAL	A/P					EFFIGY
32ME189	PVT	M					FARMSTEAD
TOTALS	**41**	**41**	**652**	**119**	**10**	**1**	**3**

ties and 17 other archeological sites would be avoided. Twenty-three fewer sites, 168 fewer stone rings, seven fewer stone cairns, and nine fewer stone alignments could be affected if Federal coal is not leased. While Table 4.2 indicates that 3,980 acres are avoided, major effects could occur on cultural sites from activities associated with mining, overburden stockpiling, haul roads, stock ponds and the like. As in Alternative A, after mining is completed land ownership would revert to private (non-corporate) ownership and access would be by permission only. None of the sites would be actively protected from future disturbances.

Alternative C (Preferred)

Alternative C proposes leasing 5,571 acres of Federal coal beneath private surface. The 240 acres above Federal coal in the northwest of Section 4, (T. 145 N., R. 88W.), and eight acres within Section 14 (T. 145 N., R. 88W.) would be stipulated as "No Surface Disturbance" to protect 12 Historic Properties, 17 other archeological sites, the Traditional Cultural Property (32ME1486 effigy) and the unmarked burial site. Under a programmatic agreement and its management plan, Alternative C includes the donation 1,720 acres and approximately $200,000 for the benefit of the North Dakota State Indian Cultural Education Trust. This includes the above-mentioned 240 acres, all 640 acres of Section 9 (T145N, R. 88W), and 240 acres of Section 14 (T145N, R. 88W) all within the WMA and 600 additional acres outside the WMA, which includes the National Register Boeckel-Renner and Bee's Nest sites.

Donor agreement(s) would provide for a donation of lands to the trust holding five (32ME182, 32ME184, 32ME1539, 32ME1486, and 32ME1577) of 14 Historic Properties located above Federal coal. In addition, lands holding seven of the 29 Historic Properties located above private or state coal within the WMA would be donated to the trust with similar provisions, including 32ME185, 32ME186, 32ME188, 32ME1562, 32ME1578, 32ME1579 and 32ME1580. Also within donor agreements, two regionally important Historic Properties, the Boeckel/Renner Site (32ME799), which contains a burial mound complex and stone features as well as a portion of the Bee's Nest Site (32ME175), which contains the remains of Raven Chief, an important Mandan leader, would be preserved. The Boeckel/Renner and Bee's Nest sites are located outside the WMA. A total of 26 non-Historic Properties would also be preserved.

Donor Agreements would place 1,720 acres into the education trust. Approximately 1,200 acres of this land would be undisturbed, retaining approximately 431 stone features including 327 stone rings, 93 stone cairns, and 11 stone alignments. The only recorded Traditional Cultural Property (32ME1486 effigy) and a 200 ft buffer surrounding the features would also preserve an unmarked burial in the WMA. Five additional burials/burial mounds would also be preserved at the Boeckel/Renner and Bee's Nest sites. Donor agreements would provide access to these sites. These sites are presently on land that is in private ownership.

Alternative C is the only one that actively preserves sites through the Indian Cultural Education Trust. Implementation of the Programmatic Agreement and Management Plan for the WMA with addition of the Boeckel-Renner and Bee's Nest sites greatly increases the acreage and archeological features preserved under Alternative C. Including donations to the trust, 105 more stone rings, 53 more stone cairns, (but 5 fewer stone alignments) are preserved than are avoided under Alternative B (see Table 4.2). In addition to physical site preservation, Alternative C would protect American Indian heritage for the future and allow free access by American Indian tribes to such lands for traditional and spiritual activities and collection of traditional plants where access may have been previously denied or limited.

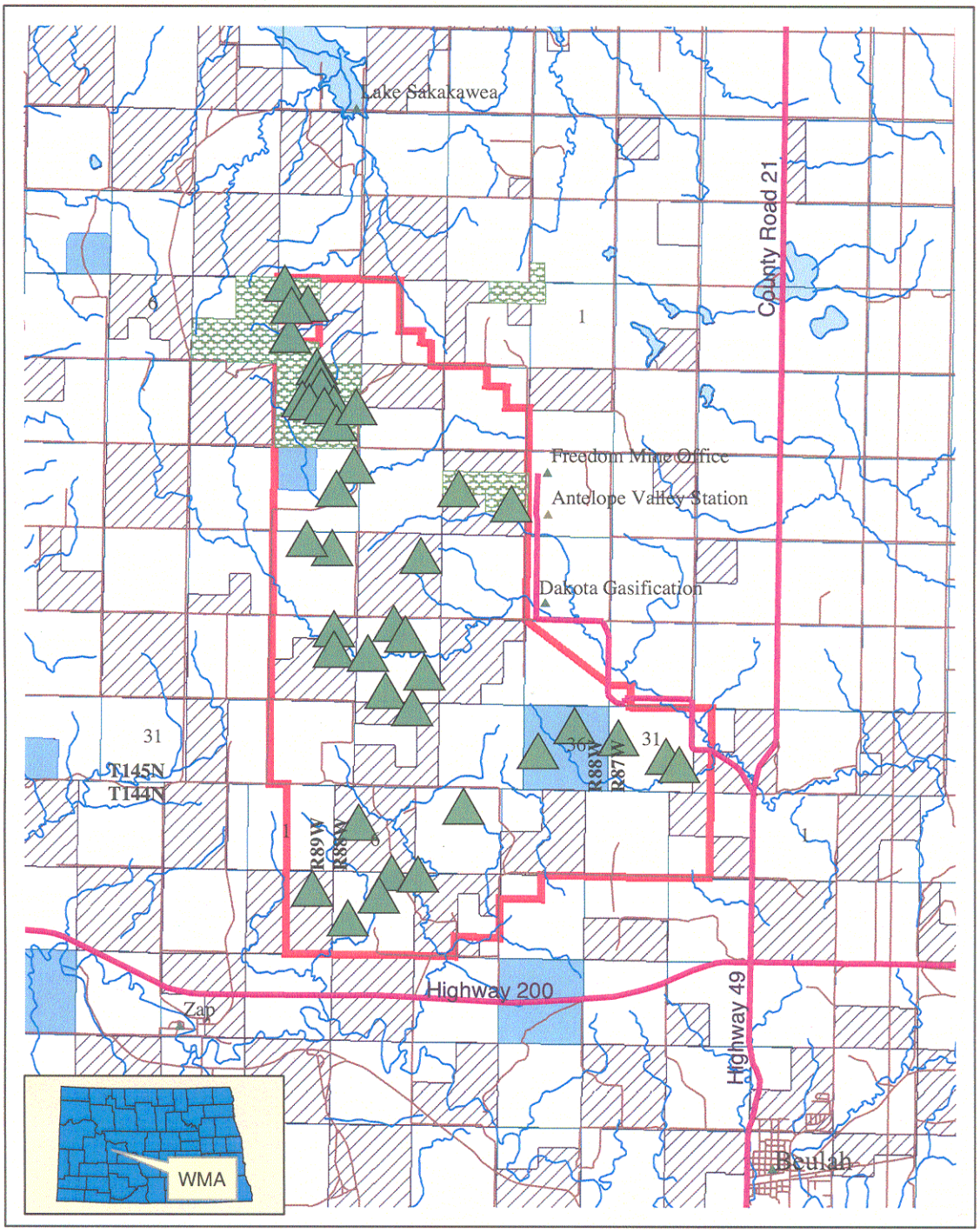
Residual Effects

All the prehistoric sites in the WMA contain information that could contribute to the interpretation of cultural heritage by archeological investigation. Under present regulations sites are evaluated for their potential to contain information related to a set of research questions determined to be important at the time of the site evaluation (Peterson 2000). The passage of time, changing perceptions of significance, or new techniques may supersede these research questions. However, the sites would be destroyed before new questions can be investigated. Therefore, there may be inherent value in all the sites and their destruction could result in residual impacts even if such sites were not currently determined significant (i.e. National Register Eligible Historic Properties).

Even on sites that are eligible and mitigated through excavation, recovery of all available information is usually not accomplished because sites are rarely completely excavated. No site in the WMA would be systematically excavated in its entirety. Information contained in remaining portions of a site is lost when mining destroys the site.

The societal bond with past ancestors and past lifeways would be severed by the destruction of visible cultural features and the natural landscape by mining of the coal. In American Indian culture, visible remnants of archeological sites (e.g. stone rings, cairns, alignments, effigies, and burials) and the site's relationship to the natural landscape are sacred (Deaver 2001). This cultural or ethnographic landscape forms a bond between the Indian community and their ancestors. Stones found in circles/cairns/alignments continue to be as ritually and culturally important today as they were in the past. Cultural representatives and tribal elders have repeatedly expressed concerns about the effects on their

Figure 4.1
West Mine Area Showing Location of Historical Properties and Federal Coal Tracts



No warranty is made by the BLM for the use of the data for purposes not intended by BLM

Table 4.2
Adverse Effects and Sites Avoided or Preserved
Preferred Alternative includes sites outside of the WMA donated as part of the Cultural Resource Management Plan

	PROPOSED ACTION ALTERNATIVE (A) WMA / FED COAL ONLY	NO ACTION (B) WMA / FED COAL ONLY	PREFERRED ALTERNATIVE (C) TRUST / FED COAL ONLY
ADVERSELY AFFECTED			
Acres	16,271 / 5,323	13,971 / 2,371	16,271 / 5,323
Historic Properties	29 / 9	29 / 9	29 / 9
Sites	222 / 79	199 / 57 +	222 / 79
Rings	1157 / 379	989 / 187+	1157 / 379
Cairns	372 / 148	365 / 127+	372 / 148
Alignments	14 / 13	5 / 4+	14 / 13
Depressions	9 / 2	9 / 2+	9 / 2
Effigies	0 / 0	0 / 0	0 / 0
Burials	0 / 0	0 / 0	0 / 0
CMS	5 / 3	6 / 0+	5 / 3
AVOIDED OR PRESERVED	(AVOIDED)	(AVOIDED)	(PRESERVED)
Acres	780 / 248	3,980 / 3,200	1,325* / 313**
Historic Properties	12 / 5	12 / 5	14 / 6
Sites	29 / 12	52 / 34	38 / 13
Rings	128 / 65	222 / 194	327 / 115
Cairns	33 / 19	40 / 40	93 / 49
Alignments	7 / 0	16 / 9	11 / 4
Depressions	0 / 0	0 / 0	0 / 0
Effigies	1 / 1	1 / 1	1 / 1
Burials	1 / 1	1 / 1	7 / 2
CMS	5 / 1	5 / 1	5 / 1

+ Haul roads, stockpiles, could affect an unknown number of additional sites
* Includes 480 acres for Boeckel-Renner and Bee's nest sites.
** Includes 65 acres of the Bee's Nest site.

communities of losing these cultural resources. Mitigation is not a reality given this belief system. As a result, residual impacts would occur.

Table 4.3
Prehistoric Sites of the West Mine Area

Prehistoric Sites	WMA	Above Federal Coal
National Register eligible	40	13
Not eligible	161	50
TOTAL	201	63

No historic-period sites (n=50) were determined eligible for listing on the National Register for archeological information they contain. One site, the Ricker Farmstead, is listed based on its architectural merit. That site would be destroyed after HABS/HAER documentation. Historic features such as this farmstead, windmills, quarry sites and bridge would no longer be visible as mining removes the structures.

The amount of residual impact is reflected in the total number of sites and features overrun by coal mining activities. Acres disturbed by mining are a means to quantify residual impacts. If impacts are mitigated they no longer are considered residual. Long-term preservation of sites and landscapes could be a means to mitigate for cultural resources. Avoidance of sites and landscapes is not the same as long term mitigation since there is no way to assess whether the sites would be adversely affected by future actions. So, within the context of this analysis the numbers of impacted sites should be balanced with the numbers preserved/mitigated.

Table. 4.4
Acres, Historic Properties, Sites, and Features Listed by Alternative

ADVERSELY AFFECTED	PROPOSED ACTION (A) WMA / FED COAL ONLY	NO ACTION (B)* WMA / FED COAL ONLY	PREFERRED ALTERNATIVE (C) WMA/ FED COAL ONLY
Acres	16,271 / 5,323	13,971/ 2,371	16,271 / 5,323
Historic Properties	29 / 9	29 / 9	29 / 9
Sites	222 / 79	199 / 57 +	222 / 79
Rings	1,157 / 379	989 / 187 +	1,157 / 379
Cairns	372 / 148	365 / 127+	372 / 148
Alignments	14 / 13	5 / 4 +	14 / 13
Depressions	9 / 2	9 / 2+	9 / 2
CMS	5 / 3	6 / 0	5 / 3

* Records only the portion within the 500 ft high wall buffer.

Counts of adversely affected sites, features, and acres are given in Table 4.4 by alternative. Within the Preferred Alternative, Table 4.4 counts those sites mitigated and avoided. Under all three alternatives, it is assumed that the TCP effigy site and a single recorded burial would be left undisturbed.

Alternative A (Proposed Action)

This alternative has the most residual effect on the landscape, historic properties, sites and features. All of the landscape, historic properties, sites and features could be adversely affected by mining activities except for the 780 acres in the WMA's northwest corner and around the TCP and unmarked burial that would be avoided by mining operations. This area contains 11 Historic Properties and 18 additional sites. Those sites and lands avoided by mining would remain in private ownership and use.

Alternative B (No Action)

Under this alternative Federal coal is not leased but residual effects may still occur on Federal tracts because of the highwall buffer zone and related activities. The State of North Dakota would require archeological investigations for those sites determined to be Historic Properties. The 780 acres would be avoided as in the Proposed Action. Those features and lands avoided by mining would remain in private ownership and use. Because of the highwall buffer zone there are only a few sites and features excluded from being affected by not leasing Federal coal.

Alternative C (Preferred)

This alternative would have the same residual effect as the Proposed Alternative except for its mitigation measures. The 780 acres that are avoided in alternatives A and B, an additional 545 acres within the Boeckel/Renner and Bee's Nest sites located outside the WMA, and approximately 395 disturbed acres would be donated to the North Dakota Cultural Education Trust as mitigation for resource and landscape loss. This is in addition to cultural resource investigations of Historic Properties within the WMA but outside the 780 acres.

As residual impacts are unavoidable impacts that cannot be mitigated this alternative provides substantially fewer residual impacts than Alternatives A or B because of mitigation measures. This is supported by Table 4.5 showing sites avoided or preserved by alternative.

With Alternative C, effects are greater than Alternative B but equal to the Proposed Action (A). This is offset by the addition of sites from outside the WMA within the North Dakota Indian Education Trust. Under Alternative C, sites are preserved and accessible rather than being avoided and remaining in private ownership with no control over their disturbance or accessibility. Even with greater adverse effects than Alternative B, Alternative C would have fewer residual impacts on the landscape and archeological remains.

It was found that significant impacts occur to cultural resources under all three alternatives. Because the surface is privately owned and the Federal coal reserves are not contiguous, ancillary activities associated with mining would destroy a significant number of prehistoric American Indian stone features whether Federal Coal is leased or not. Through consultation with Tribal representatives it was determined that mining of the coal would affect the Hidatsa, Mandan, Arikara, Sioux, and Assiniboine. These Tribes have well documented historic ties to the area.

Table 4.5
Avoided Sites are Retained in Private Ownership
Preserved sites are placed in the North Dakota Indian Education Trust for preservation

AVOIDED OR PRESERVED	PROPOSED ACTION (A) WMA / FED COAL	NO ACTION ALTERNATIVE (B) WMA / FED COAL	PREFERRED ALTERNATIVE (C) WITH ADDITION OF TRUST LANDS OUTSIDE WMA TRUST/ FED COAL
Acres	780 / 248	3,980 / 3,200	1,325 / 313
Historic Properties	12 / 5	12 / 5	14 / 6
Sites	29 / 12	52 / 34	38 / 13
Rings	128 / 65	222 / 194	327 / 115
Cairns	33 / 19	40 / 40	93 / 49
Alignments	7 / 0	16 / 9	11 / 4
Depressions	0 / 0	0 / 0	0 / 0
Effigies	1 / 1	1 / 1	1 / 1
Burials	1 / 1	1 / 1	7 / 2
CMS	5 / 1	5 / 1	5 / 1

Cumulative Effects

Arguably, there is inherent value in all cultural sites and their destruction would result in cumulative impacts through the loss of the resource from the mining of coal (see Residual Impacts). The loss of a natural landscape and its relationship to the sites is also a substantial and important impact, especially to American Indians who have been consulted (Deaver 2001).

The Cultural Resource Management Plan associated with the current undertaking is designed to explain the distribution of cultural sites within the WMA and across the "Coteau Mining Region." The focus of this investigation is on the current record of previously permitted mining areas as well as additional field investigations within the WMA. Coteau plans to develop additional reserves (private coal) in Mine Area 2 North. Three geographic areas, (1) previous Freedom Mine investigations, (2) the WMA, and (3) Mine Area 2 North, including cultural and natural resources, may be defined as a cultural landscape (Figure 4.2).

The cultural landscape includes 68,683 acres that have been surveyed for archeological remains. The number of sites recorded is 740. These sites include some 1,950 stone rings, 541 cairns, and 61 other cultural material scatters or features.

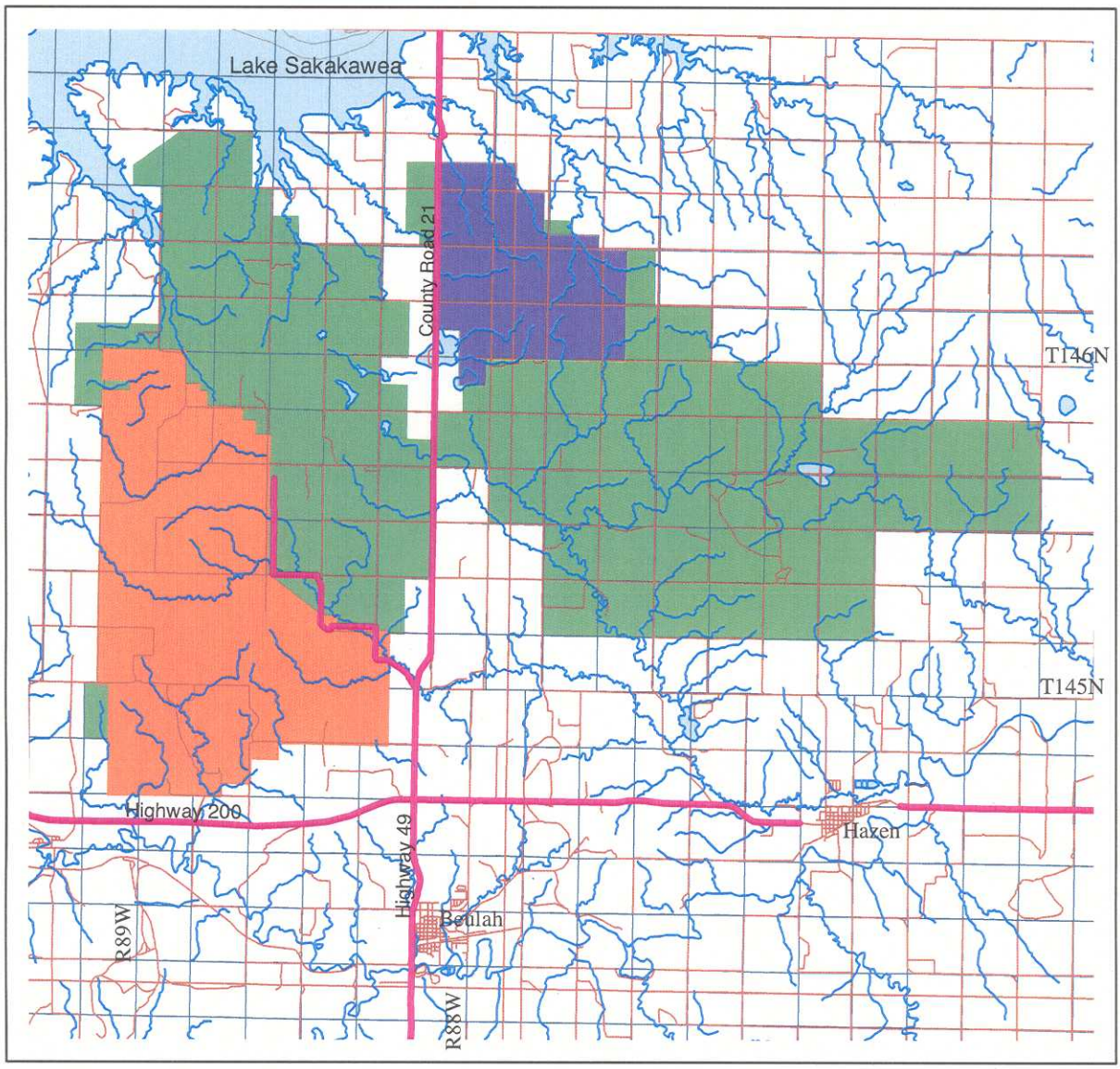
Cumulative impacts are discussed in terms of past effects, effects of the current undertaking, and foreseeable effects of future mining actions of the Freedom Mine on site loss, sites mitigated, and acres disturbed. These categories can be defined in terms of the portions of the cultural landscape that directly relate to the three geographic areas (1) previous mining of the Freedom Mine, (2) WMA, (3) Mine Area 2 North. The cumulative impacts for cultural resources are shown in Table 4.6.

Table 4.6
Acres and Sites Affected by WMA Activity

	Coteau Mining Region Total / Federal Coal	Mine Related Activities*** Total / Federal Coal	WMA Total / Federal Coal	Mine Area 2 North Total / Federal Coal
Acres	68,683 / 14,043	45,214/8,412	17,051 / 5,571	6,418 / 160**
Total Sites	740 / 189	427 / 98	251 / 91	62 / n/a
Prehistoric Sites	470 / 133	238 / 70	198 / 63	34 / n/a
Historic Sites	270 / 56	189 / 28	53 / 28	28 / n/a
Stone Rings	1950 / 541	503 / 97*	1,285 / 444	162 / n/a
Stone Cairns	541 / 197	112 / 30*	405 / 167	24 / n/a
Other Features	61 / 28	34 / 7*	19 / 21	8 / n/a
Sites Mitigated	Currently 60 / 8	19 / 3	41 / 5	Undetermined

* Provided by Coteau
** Federal Coal would be bypassed.
*** In addition to surface mining includes power plant, synfuels operation, and ancillary facilities.

Figure 4.2
Cultural Landscape of Coteau Mining Region



Legend

- West Mine Area
- Mine Area 2 North
- Previous Freedom Mine Investigations

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No warranty is made by the BLM for the use of the data for purposes not intended by BLM

Mine related activities encompass 45,214 acres. Within this area 422 sites have been affected. Sites 32ME175, 32ME158, 32ME 1463, and 32ME1528 or parts thereof have been avoided (Friedlander 2003). Nineteen sites have been excavated (Appendix A). In total, approximately 63 rings, 16 cairns, and 800 square meters outside of visible features were systematically excavated. One site was graded by a road patrol.

Depending on the alternative, between 13,971 and 16,271acres would be adversely affected by mining within the WMA. Between 199 and 222 sites would be destroyed or affected by the mining (depending on alternative). These sites contain 652 stone rings, 119 cairns, and 14 other visible features. Forty-one sites within the WMA would be avoided, preserved, or mitigated under all alternatives. Under the Alternative C (preferred) donor agreements would preserve 11 Historic Properties and 18 other prehistoric sites in the Indian Education Trust; the TCP and unmarked burial would be preserved, and 28 archeological sites would be investigated.

The Mine Area 2 North would disturb some 6,418 acres and 62 sites. One hundred sixty-two stone rings, 24 cairns, and eight other visible features would be destroyed or affected by the mining. The one site, 32ME254, containing nearly half the visible features has already been investigated under a previous agreement.

In total, there would be cumulative impacts to approximately 69,000 acres affected by operations at the Freedom Mine. Approximately 740 sites, 447 prehistoric and 293 historic sites, would be destroyed or adversely affected by mining. Visible stone features including approximately 1,950 stone rings, 541 cairns, and 61 other identified features would be gone. For these sites within the Freedom Mine area, the Historic Properties were subjected to treatment plans complying with Section 106 of the National Historic Preservation Act.

4.9 ENVIRONMENTAL JUSTICE

Impacts Common to All Alternatives

Input from all persons or groups-regardless of age, race, income status, or other social/economic characteristics-were considered. Consultation has been ongoing with representatives of the following tribes: Three Affiliated Tribes, Standing Rock Sioux Tribe, Yankton Sioux Tribe, Flandreau Santee Sioux Tribe, Winnebago Tribe, Northern Cheyenne Tribe, Crow Creek Sioux Tribes, and Lower Brule Tribe. Indian cultural representatives and elders have expressed concerns about the cumulative effects of mining operations on their communities (Deaver, 2001).

Alternative A (Proposed Action)

For American Indians, the societal bond with past ancestors and lifeways would be severed by destruction of visible cultural features and the natural landscape. This is a substantial and important impact, especially to American Indians who have been consulted (Deaver, 2001). In addition, all prehistoric sites contain information that might contribute to understanding of cultural heritage through archeological investigation. Any information from these sites that is not retrieved under current mitigation plans would be lost to future generations. Under this alternative 5,323 surface acres above Federal coal would be disturbed.

Alternative B (No Action)

Same as A but 2,371 acres would be disturbed.

Alternative C (Preferred)

The same amount of acreage would be disturbed as under Alternative A but under this alternative cultural sites would be actively preserved through the Indian Cultural Education Trust (see Chapter 4 Cultural sections).

4.10 SOCIO-ECONOMICS

Social

Alternative A (Proposed Action)

There would be social impacts to American Indians. These impacts would be greatest under Alternative A and are discussed in the Cultural section of this alternative.

Alternative B (No Action)

The level of mining would stay the same under this alternative. However, local officials are concerned that less money would be available to local governments for road maintenance, schools and other services if the Federal coal were not available. Effects to American Indians would be similar to Alternative A but less land would be affected (2,373 acres in alternative B compared to 5,323 acres in Alternative A).

Alternative C (Preferred)

There would be social impacts to American Indians. These impacts are discussed in the Cultural section of this alternative. Most importantly, under this alternative, access would be provided to cultural sites currently held in private ownership.

A trust fund for cultural education would be provided to Tribes to invest in their cultural and social heritage.

Economics

Coteau would mine the WMA according to approved mining and reclamation plans under all three alternatives. As a result there would be little change in employment, however, the life of mining in the WMA would be determined by the availability of the Federal reserves.
Alternative A (Proposed Action)

The leasing of 5,571 acres containing an estimated 90 million tons of Federal coal would permit the maximum economic recovery of the Federal coal and the intermingled non-Federal coal. Leasing would promote resource conservation and provide the continued payment of the State's share of the Federal coal royalties from the mine.

Alternative B (No Action)

Federal coal would not be offered for lease, however, mining would continue to supply existing contracts. There would be no change in employment or production in the short term but mining in the WMA would be shortened due to the loss of reserves and Federal royalties from 90 million tons of unleased Federal coal would be foregone. The cost of mining non-Federal coal would increase and the ultimate recovery of the non-Federal coal would decrease.

Alternative C (Preferred)

Impacts would be the same as under Alternative A; mining would proceed according to approved mining and reclamation plans. The life of mining in the WMA would be determined by the availability of the Federal reserves.

If Federal coal is not leased, loss of state and Federal revenues would occur and a nonrenewable resource (coal) would not be utilized.

4.11 REGULATORY COMPLIANCE, MITIGATION AND MONITORING

All alternatives assume that proper mining and reclamation would be carried out in accordance with existing state and Federal regulations. PSC has primacy over surface mining and reclamation and oversees all aspects of operations. Bonding is required of companies through all phases of mining and reclamation.

Sedimentation ponds and wetlands constructed during reclamation would compensate for mitigation of any wetland habitat removed during mining. North Dakota's law mandating "no net loss" of wetlands and Federal Executive Order 11990, dictating wetland protection, require that habitat losses be completely compensated through the reclamation process.

Native prairie and wood/shrub habitat removed by mining would be replaced according to surface owner preference statements. Details on reclamation plans would be worked out between the lessee and PSC in the PAP, with review and approval by appropriate state and Federal agencies.

Prime farmlands would be handled according to the performance standards found in the Rules Governing the Reclamation of Surface-Mined Land by the PSC.

4.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The major commitment of resources would be the mining and burning of coal for electrical generation and synfuels production. It is estimated that one to two percent of the energy produced would be required to mine the coal. This energy would be irretrievably lost. Mining the coal seam would remove a ground water aquifer.

Croplands would suffer an irretrievable loss of forage and crop production; rangelands face loss of forage for domestic and wildlife grazing during mining and early reclamation. The soil profile would be changed on areas disturbed by mining and subsequent reclamation. Soil forming processes, although continuing as soil material is replaced over reshaped overburden, would be irreversibly altered. Replaced soil would be unlike any found in a natural setting.

Mining would disturb the general topography with its pattern of cropland, native prairie, wetlands, and wood/shrub areas. Reclamation would forge a new landscape with its own character.

Any loss of wildlife or human life due to mining and reclamation would be an irretrievable commitment of resources.

For American Indians and local residents, the societal bond with past ancestors and lifeways would be severed by destruction of visible cultural features and the natural landscape. All prehistoric sites within the WMA contain information that might contribute to understanding of cultural heritage through archeological investigation. Any information from these sites that is not retrieved under current mitigation plans would be lost to future generations. Accidental destruction of unknown cultural resources would be irreversible and irretrievable as well.

Action alternatives A (proposed) and C (preferred) have the same irreversible and irretrievable commitments of cultural resources on Federal tracts. Alternative C would mitigate the loss of cultural resources through a cultural trust. Alternative B (No Action) has the fewest irreversible and irretrievable commitments of cultural resources, even though substantial impacts would occur above unleased Federal coal tracts.

To summarize the numbers of sites and features affected: Alternatives A and C would impact the same number of cultural resources. Alternative B would result in a substantial loss of resources, though fewer than under either action alternative. The exact number of features affected under alternative B is difficult to quantify because of incidental impacts.

Mining under either action alternative (A or C) would disturb 5, 323 surface acres above Federal coal compared to 2, 371 surface acres under Alternative B. Nine Historic Properties would be destroyed under any of the alternatives. Seventy-nine cultural sites would be destroyed under A or C, while 57 sites would be destroyed under B. Selection of Alternative B would affect half the number of stone rings (187 vs. 379) compared to alternatives A or C. Alternatives A or C would affect 148 stone cairns; 127 stone cairns would be affected by B. Thirteen stone alignments would be destroyed under alternatives A or C compared to 4 under B. Two stone-lined depressions would be destroyed under any alternative. Finally, alternatives A or C would destroy 3 cultural material scatters while no scatters would be affected under Alternative B.